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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/802,375	03/09/2001	Nazir Ahmad	CPAC 1002-1US	8400

22470 7590 04/13/2004

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EXAMINER

VU, QUANG D

ART UNIT PAPER NUMBER

2811

DATE MAILED: 04/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/802,375	Applicant(s) AHMAD ET AL.	
	Examiner Quang D Vu	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 14-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 14 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No. 5,346,857 to Scharr et al.

Scharr et al. (figure 2) teach a chip (26) having bumps (28) formed thereon and a substrate (21) having interconnect points on a metallization (23) thereon, the bumps (28) forming contacts with the interconnect points, wherein each the contact comprises an interconnection layer situated at an interface between the bump (28) and the interconnect point (metallization layer [23]) in contact therewith, the layer comprising an alloy (a region indicated by line [29]) of the material of the bump (28) and the material of the metallization (23) (see figure 2; column 3, line 54 – column 4, line 16).

Regarding claim 16, Scharr et al. teach the bump (28) material comprises gold and the interconnect points (metallization [23]) comprise Sn, and the alloy (a region indicated by line [29]) at the interface comprises an Au/Sn alloy (see figure 2; column 3, line 54 – column 4, line 16).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 15 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scharr et al. in view of US Patent No. 6,326,234 to Nakamura.

Regarding claim 15, Scharr et al. differ from the claimed invention by not showing a cured adhesive polymer is situated in a middle region between the bump surface of the chip and the surface of the substrate. However, Nakamura teaches an adhesive polymer (7) is situated in a middle region between the bump surface of the chip (1) and the surface of the substrate (2) (see figure 4). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to incorporate the teaching of Nakamura into the device taught by Scharr et al. because it provides good adhesion between the chip and the substrate. The combined device shows a cured adhesive polymer is situated in a middle region between the bump surface of the chip and the surface of the substrate.

Regarding claim 18, the disclosures of Scharr et al. and Nakamura are discussed as applied to claims 14 and 15 above.

Regarding claim 19, the disclosures of Scharr et al. and Nakamura are discussed as applied to claim 18 above.

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Scharr et al. further teach the bump (28) material comprises gold and the interconnect points (metallization [23]) comprise Sn, and the alloy (a region indicated by line [29]) at the interface comprises an Au/Sn alloy (see figure 2; column 3, line 54 – column 4, line 16).

Regarding claim 20, the disclosures of Scharr et al. and Nakamura are discussed as applied to claim 19 above.

Scharr et al. and Nakamura differ from the claimed invention by not showing the alloy at the interface is a 20:80 Sn:Au alloy. It would have been obvious to one having ordinary skill in the art at the time the invention was made for an alloy at the interface is 20:80 Sn:Au alloy, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,346,857 to Scharr et al.

Regarding claim 17, Scharr et al. do not explicitly teach the alloy at the interface is 20:80 Sn:Au alloy. It would have been obvious to one having ordinary skill in the art at the time the invention was made for an alloy at the interface is 20:80 Sn:Au alloy, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scharr et al. in view of US Patent No. 5,997,633 to Suzuki et al.

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Regarding claim 21, the disclosures of Scharr et al. and Nakamura are discussed as applied to claims 18-20 above.

Scharr et al. and Nakamura differ from the claimed invention by not showing the adhesive polymer forming an underfill. However, Suzuki et al. (figure 14) teach the adhesive polymer forming an underfill (1010). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Suzuki et al. into the device taught by Scharr et al. and Nakamura because it provides good adhesion between the chip and the substrate. The combined device shows the adhesive polymer forming an underfill.

### ***Response to Arguments***

Applicant's arguments filed 03/15/04 have been fully considered but they are not persuasive.

It is argued, in page 8 of the remarks, that Scharr et al. do not teach or suggest the claimed limitation of claim 14. This argument is not convincing because Scharr et al. (figure 2) teach a chip (26) having bumps (28) formed thereon and a substrate (21) having interconnect points on a metallization (23) thereon, the bumps (28) forming contacts with the interconnect points, wherein each the contact comprises an interconnection layer situated at an interface between the bump (28) and the interconnect point (metallization layer [23]) in contact therewith, the layer comprising an alloy (a region indicated by line [29]) of the material of the bump (28) and the material of the metallization (23) (see figure 2; column 3, line 54 – column 4, line 16).

It is argued, in page 9 of the remarks, that Scharr et al. and Nakamura do not teach or suggest the claimed limitation of claim 15. This argument is not convincing because the

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combined device (Scharr et al. and Nakamura) shows the claimed limitation of claim 15 for the reason that is discussed above.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D Vu whose telephone number is 571-272-1667. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qv  
April 1, 2004

Steven Loke